THE LUNAR PHASE CURVE IN THE NEAR ULTRAVIOLET. A. R. Hendrix, Jet Propulsion Laboratory/California Institute of Technology, amanda.hendrix@jpl.nasa.gov.

Introduction: We present results from an ongoing program to perform UV measurements (215.0 and 237.0 nm) of the Moon at varying solar phase angles to understand the lunar phase curve at ultraviolet wavelengths. We use new observations from the Ultraviolet Spectrometer (UVS) aboard the Student Nitric Oxide Explorer (SNOE) combined with existing observations from the Galileo UVS. The lunar UV phase curve can be used to further understand the scattering properties of the lunar surface. The Moon's scattering properties at visible wavelengths are well understood [1]; studying scattering properties at shorter wavelengths may provide insight into the roles of volume scattering vs. surface scattering and how weathering processes may affect scattering properties [2]. The UV lunar phase curve can also be helpful for UV observers, as the Moon is often used as a UV calibration source, but the UV brightness variation with phase angle has not been well understood.

SNOE UVS Moon Observations: The SNOE satellite has been in Earth orbit since March 1998. It was built and is currently operated at the Laboratory for Atmospheric and Space Physics at the University of Colorado. The primary objective of SNOE is to measure nitric oxide in the Earth's atmosphere, as well as to measure solar soft x-rays [3]. The SNOE spacecraft is in a low altitude, polar Earth orbit. The UVS on the spinning spacecraft is in a configuration such that it serendipitously observes the Earth's moon once per month. The angle between the orbital plane and the sun varies with time; this beta angle was initially ~25°. Thus the lunar measurements generally occur 1-2 days before full moon. The offset angle between the orbital plane and the UVS viewing direction can be adjusted, thereby varying the solar phase angle at which the moon is observed. The UVS slit is 0.75°x0.071°, so as the slit scans over the moon, 7-9 samples are obtained. The UVS has two spectral channels, 215.0 nm and 236.5 nm, each with a bandpass of 3.6 nm. The UVS has made measurements of stellar sources, and calibration of both channels is well understood.

The SNOE lunar data set consists of both serendipitous and dedicated observations. The initial moon observations performed by SNOE were purely serendipitous. During the first month of the mission, the moon was observed, ~2 days before full moon, as SNOE passed over the north pole.

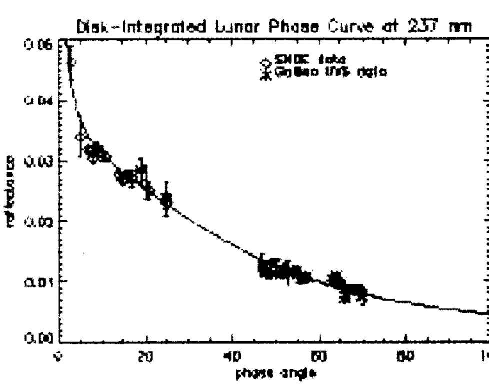
The first dedicated Moon observation was performed in February of 2000. The observational timing was changed during the nighttime portion of the orbit so that, rather than scanning the limb, the UVS scanned the portion of the sky (in the zenith direction) where the Moon was projected to be, based on the knowledge of the Moon's right ascension and declination. Other dedicated lunar observations have been performed, to observe the Moon at a smaller phase angle than the orbital beta angle.

The solar phase angle during each Moon observation is determined using data from the Solar Angle Sensor on the Solar X-Ray Photometer, which measures the angle between the sun and the viewing direction of the instruments.

Galileo UVS Moon Observations: To increase the phase angle range of the Moon observations, we have combined the SNOE data with data from the Galileo UVS encounters with the Moon. The phase angle range from the Galileo flybys is ~19°-70°, providing some overlap with the SNOE data set in addition to valuable larger phase angle coverage. The Galileo UVS F-channel covers the 200-320 nm wavelength range; in this analysis we use only the data from the ranges covered by the SNOE UVS channels.

Analysis: The phase angle range of the current data set is 3.5-70°. We model the data using the Hapke model (see the figure below) to derive a determination of the ultraviolet photometric parameters of this relatively well-understood surface. These Hapke parameters can then be used for comparison with visible results to understand changes in the scattering properties of the surface with decreasing wavelength.

References: [1] Helfenstein, P. and J. Veverka (1987) *Icarus, 72,* 342-357. [2] Henry, R. C., W. G. Fastie, R. L. Lucke, B. W. Hapke (1976) *Moon, 15,* 51-65. [3] Barth, C. A., S. M. Bailey, S. C. Solomon. (1999) *GRL, 26,* 1251-1254. [4] Hendrix, A. R. (1996) *Ph.D. Thesis.*



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